

## **GB1424365**

Publication Title:

**METHOD FOR PRODUCING PREDETERMINED WALL THICKNESS  
CHANGES IN ROTATIONALLY SYMMETRICAL HOLLOW BODIES**

Abstract:

Abstract of GB 1424365

(A) 1424365 Rolling tubes MESSERSCHMITTBOLKOW - BLOHM GmbH 17 May 1973 [25 May 1972] 23597/73 Heading B3M Internal annular or helical grooves or ribs are formed in a workpiece tube 1 by mounting the tube on a mandrel having ribs or grooves complementary to those to be formed in the tube, and rolling the tube against the mandrel. The tube is subsequently removed from the mandrel, suitable by cooling the mandrel.

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# PATENT SPECIFICATION (11)

1424365

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(19)



## (54) "METHOD FOR PRODUCING PREDETERMINED WALL THICKNESS CHANGES IN ROTATIONALLY SYMMETRICAL HOLLOW BODIES".

(71) We, MESSERSCHMITT-BOLKOW-BLOHM Gesellschaft mit Beschränkter Haftung, of 8000 München, Western Germany, a Company organised and existing under the laws of Western Germany, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a method for the production of predetermined wall thickness changes in a rotationally symmetrical hollow body.

In the processing of rotationally symmetrical hollow bodies, such as thin metal pipes of deformable materials, e.g. metal cylinders of various diameters, it is often necessary for reinforcement ribs or other wall thickness changes in the form of grooves which serve as predetermined breaking points to be worked into the internal surface of the pipe.

The production of such wall thickness changes is a complicated and expensive operation, and it is impossible, particularly in the case of thin-walled metal pipes, to carry it out economically by known processes.

Attempts have been made, for example, to produce wall thickness changes in hollow bodies by constantly moving them longitudinally on a short solid mandrel provided, for example, with a longitudinal groove or rib, the outer peripheral surface of the hollow body being subjected to impact or high kinetic energy by means of a swaging machine during the relative movement between the body and the mandrel. The purpose of the impacts is to reduce the wall thickness and to form an inwardly projecting reinforcement.

This process for the re-shaping of thin-walled pipes, however, is not always suitable, particularly if the diameter of the hollow body changes unevenly and in a

manner which cannot be controlled exactly. Precision manufacture with machines in which the method of operation resembles forging cannot be carried out economically. However in precision manufacture attempts have been made to produce grooves in the internal walls of hollow bodies by metal removing machines e.g. by means of cutting tools with thin-walled workpieces, however, this involves considerable difficulties.

Particular care must be taken to maintain maximum accuracy in the processing of hollow bodies intended for use as envelopes or shells and to ensure that they retain the correct shape positively as the properties and usability of the finished unit largely depend thereon.

The object of this invention is to overcome or minimise the above discussed drawbacks of the prior art.

According to the present invention we provide a method for the production of predetermined wall thickness changes in a rotationally symmetrical hollow body by using a mandrel provided with an impression negative with respect to that to be formed on the hollow body, the method comprising placing on the mandrel a cylindrical workpiece of a wall thickness greater than the intended wall thickness of the resultant hollow body, applying by means of rollers continuous pressure to the external surface of the workpiece whilst the workpiece is rotating and moving axially with the mandrel to elongate the workpiece along the mandrel and form a reverse impression on its inner surface to that of the mandrel the external surface of the mandrel being provided with intersecting helical grooves or with annular grooves, and subsequently removing the mandrel from the finished workpiece formed with corresponding intersecting helical ribs or with corresponding annular ribs by increasing the diameter of the workpiece relatively to the mandrel. If desired the

mandrel may be cooled after termination of application of continuous pressure to be workpiece.

5 The invention enables wall thickness changes to be produced on the internal walls of hollow bodies in a simple manner without additional operation, such as shaping methods which involves the removal of metal. The ribs of the finished workpiece can be of semi-circular, angular or of other cross-section. They may, for example, consist of intersecting helical ribs or of annular ribs.

10 The application of continuous pressure in the method in general ensures the advantage, amongst others, that the structure of the workpiece is improved and strengthened. This has a favourable effect with extremely thin-walled hollow bodies, in which consolidation of the structure of the material is desirable. In addition, the invention enables working time, machine time, tool wear and consumption of material to be reduced, as the continuous pressure method replaces all production processes involving cutting.

15 Reference will now be made to the accompanying drawings in which:-

20 Figure 1 shows in perspective one form of sleeve obtainable by the process of the invention, the sleeve being opened longitudinally for clarity, and

25 Figure 2 shows a similar view of another form of sleeve obtainable by the process of the invention.

30 The sleeve 1 of Figure 1 will have been obtained using a mandrel having a grooved surface corresponding to intersecting helical ribs 2 shown in the finished sleeve. Similarly the sleeve 1' of Figure 2 will have been obtained using a mandrel having a prooved surface corresponding to the annular ribs 3 shown in the finished sleeve.

35 Withdrawal of the finished workpiece is possible when the diameter of the workpiece has been increased relatively to the mandrel,

the excess diameter being at least twice that of the thickness of the ribs of the workpiece.

#### WHAT WE CLAIM IS:-

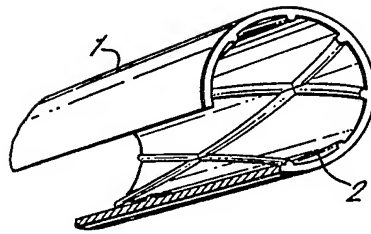
1. A method for the production of pre-determined wall thickness changes in a rotationally symmetrical hollow body by using a mandrel provided with an impression negative with respect to that to be formed on the hollow body, the method comprising placing on the mandrel a cylindrical workpiece of a wall thickness greater than the intended wall thickness of the resultant hollow body, applying by means of rollers continuous pressure to the external surface of the workpiece whilst the workpiece is rotating and moving axially with the mandrel to elongate the workpiece along the mandrel and form a reverse impression on its inner surface to that of the mandrel, the external surface of the mandrel being provided with intersecting helical grooves or with annular grooves, and subsequently removing the mandrel from the finished workpiece formed with corresponding intersecting helical ribs or with corresponding annular ribs by increasing the diameter of the workpiece relatively to the mandrel.

2. A method according to claim 1 wherein the mandrel is cooled after termination of the application of continuous pressure to the workpiece.

3. A method according to claim 1 substantially as herein described with particular reference to Figure 1 or Figure 2 of the accompanying drawings.

4. A shaped hollow body which has been produced by the method claimed in any preceding claim.

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*FIG. 1.**FIG. 2.*